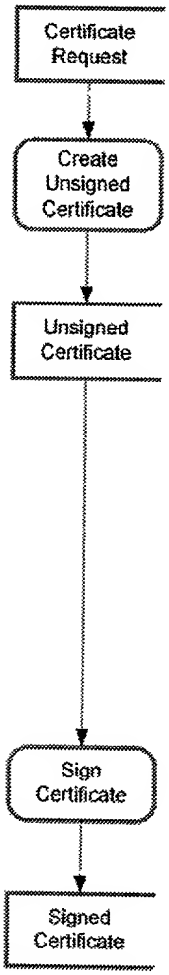


Figure 1a. Conventional Certificate Signing Process

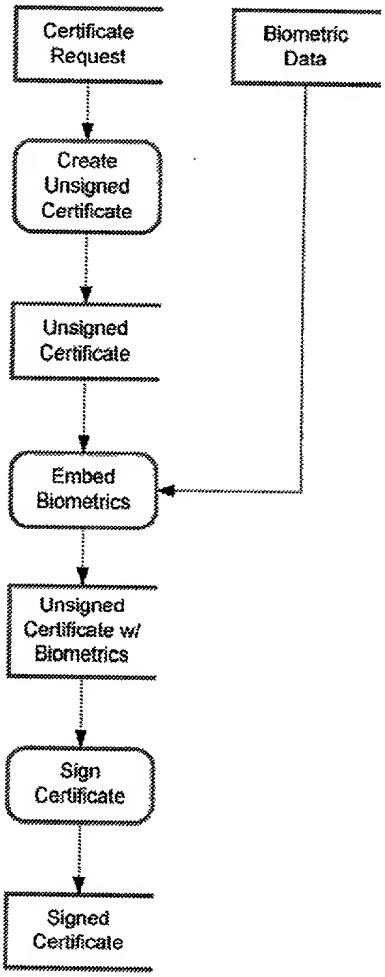


Figure 1b. Modified Certificate Signing Process

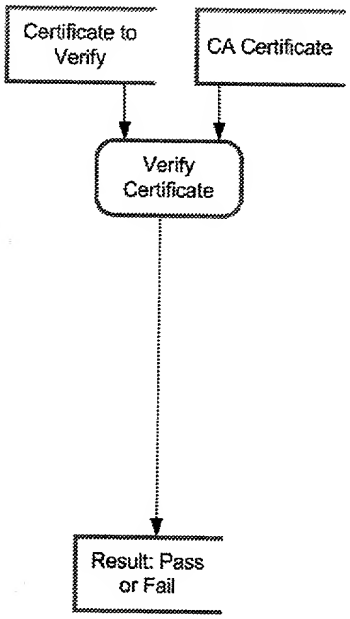


Figure 2a. Conventional Certificate Verification Process

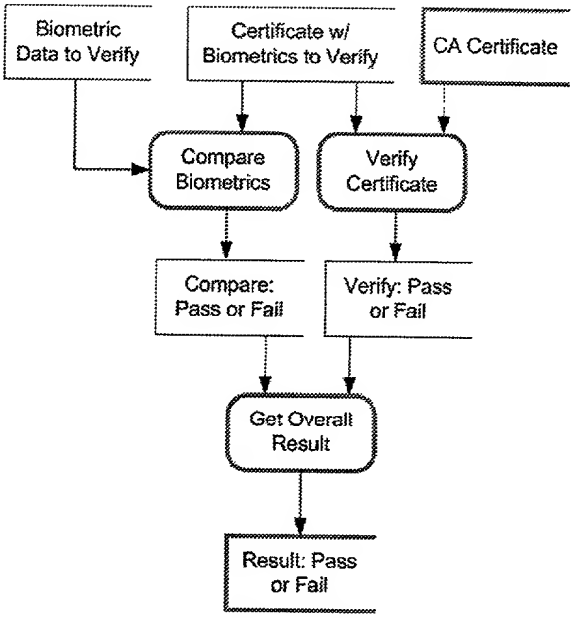


Figure 2b. Modified Certificate Verification Process

BLACK BORDERS

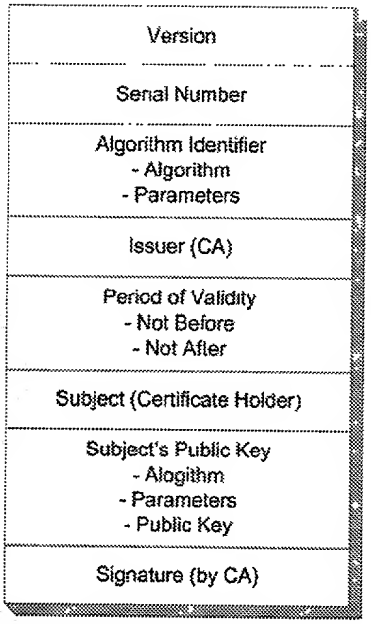


Figure 3a. Standard X.509 Certificate Structure

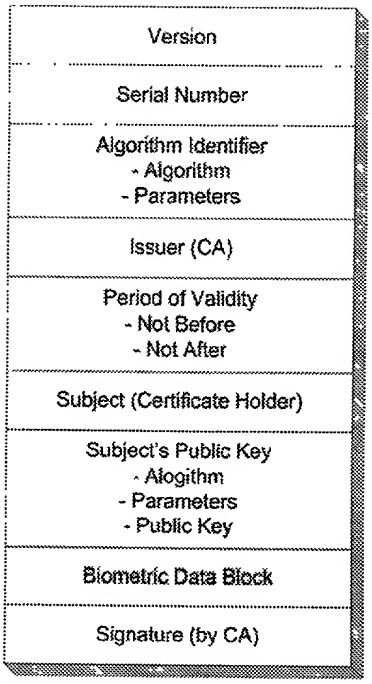


Figure 3b. Standard X.509 Certificate Structure with Embedded Biometric Data

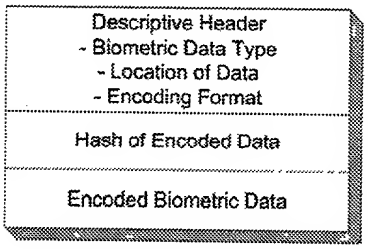


Figure 4a. Encoding of Biometric Data Block - Biometric Data Embedded

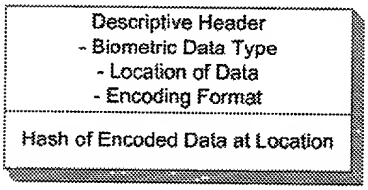
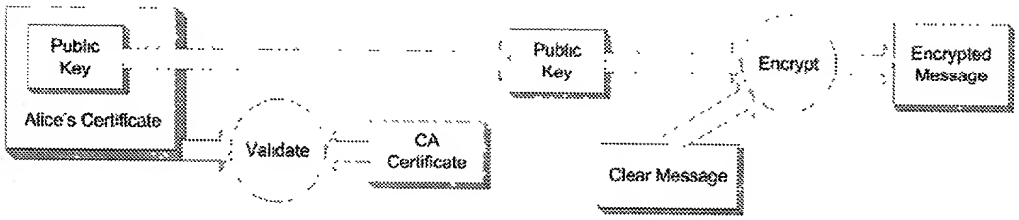
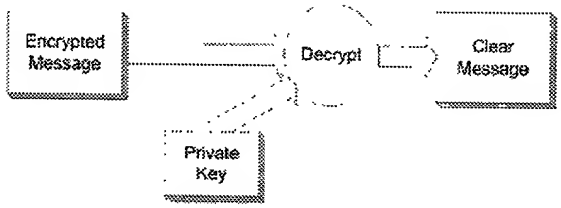


Figure 4b. Encoding of Biometric Data Block - Biometric Data Referenced



Alice gives Bob her certificate. Bob validates Alice's certificate against the CA's certificate. Bob uses the public key from Alice's certificate and a clear text message, as input to an encryption engine, to produce an encrypted message that only Alice can read.

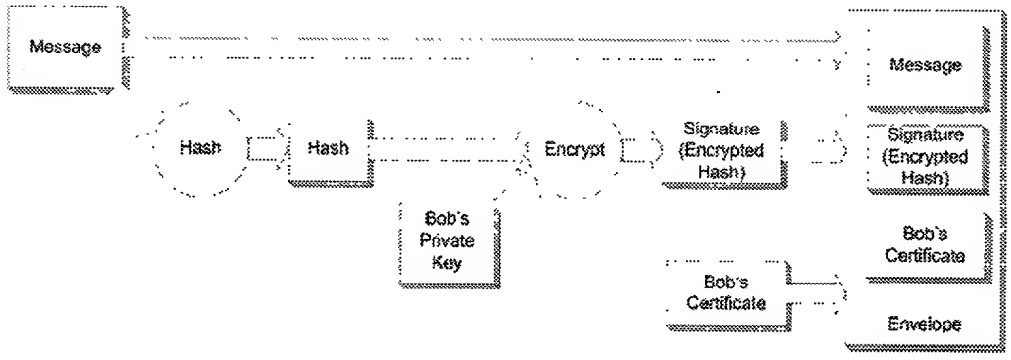
Figure 5a. Using public key encryption to encrypt a message



Alice uses the encrypted message from Bob, and her private key, as input to an decryption engine, to produce the clear text message from Bob.

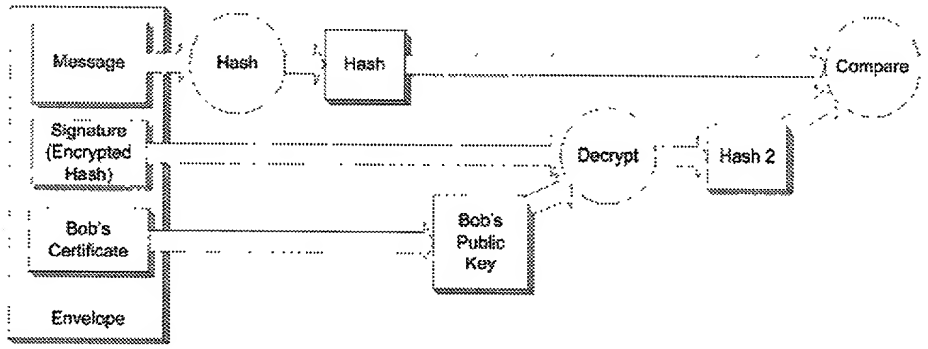
Figure 5b. Using public key encryption to decrypt a message

09683907 - 030205



Bobs uses his message | as input to a hash engine | to produce a hash. He then uses this hash. | and his private key. | as input to an encryption engine, to produce a signature. | Bobs puts the message, the hash, and his certificate into a digital 'envelope'.

Figure 6a. Using public key encryption to sign a message



Alice uses Bob's message | as input to a hash engine | to produce a hash. | She then uses the public key from Bob's certificate, | And Bob's signature as input to a decryption engine, | to produce another hash. | If the hashes match, she knows she has a valid signature.

Figure 6b. Using public key encryption to validate a digital signature

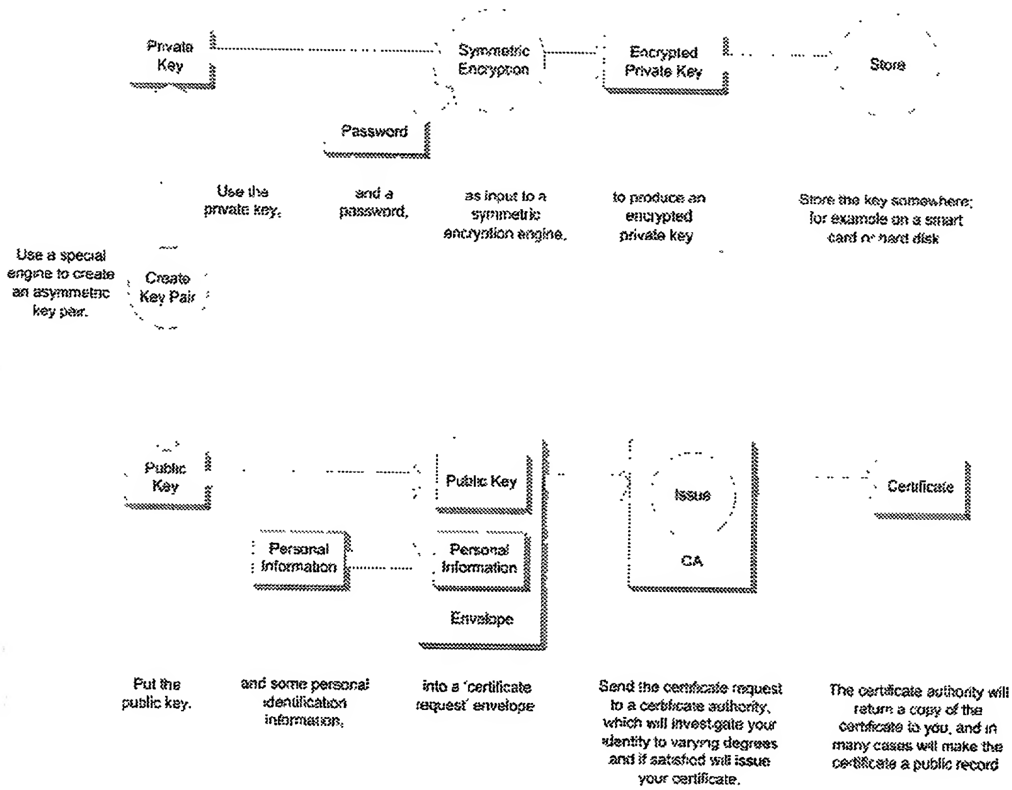


Figure 7. Using public key encryption to acquire a signed digital certificate